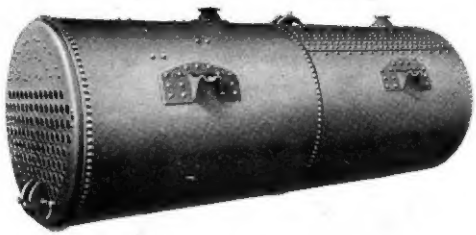
VULCAN IRON WORKS LIMITED

ESTABLISHED 1874

VULCAN

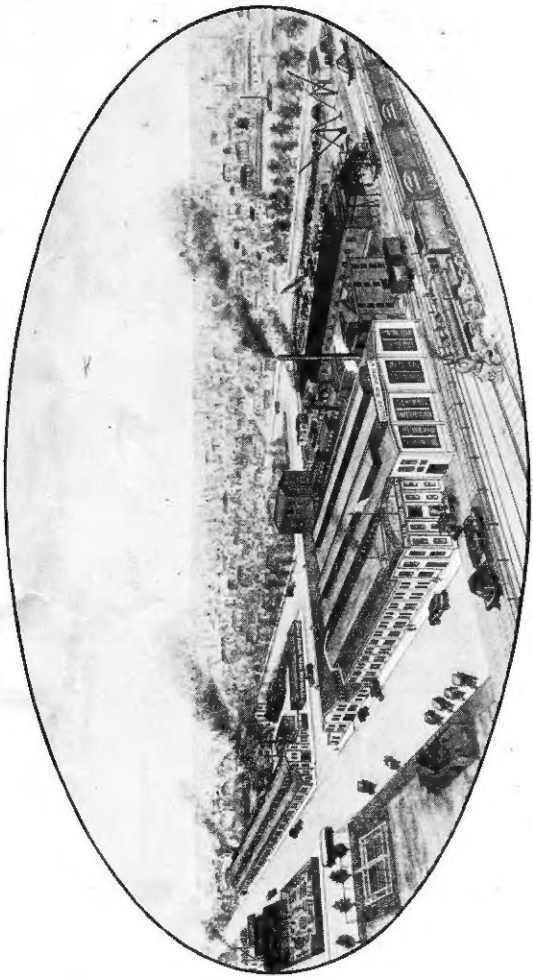


POWER BOILERS

HORIZONTAL RETURN TUBULAR

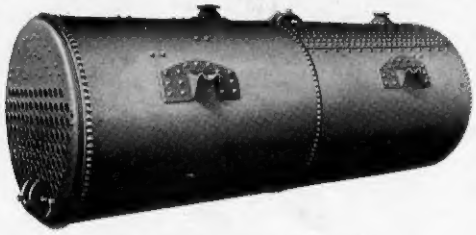
WINNIPEG CANADA

JAN., 1932 P-12



General Offices and Works, Point Douglas Ave., Winnipeg, Canada

VULCAN POWER BOILERS
Horizontal Return Tubular Type



Vulcan Power Boiler
Fig. No. 317

In presenting this bulletin on VULCAN H.R.T. Power Boilers, we wish to describe and tabulate what we consider as a series of standard boilers. You will find that they are proportioned according to the best engineering practice of to-day and according to experience gained through half a century in the boiler business.

We carry a large stock of boilers at all times for immediate shipment. However, if a certain size is not in stock at the time of placing an order it can be made up on short notice.

MATERIAL:

All plates used in the construction of our boilers are of the best quality flange steel with a tensile strength from 55,000 to 65,000 pounds per square inch. Tubes are hot drawn seamless. Flanges and nozzles are of forged steel and braces are from selected open hearth steel 60,000 pounds tensile strength.

CONSTRUCTION:

All VULCAN Boilers are manufactured according to the Canadian Inter-Provincial Regulations, from registered designs.

Shells up to and including 8′0″ in length are usually made in one section, from 10′0″ up to and including 18′0″ in two sections, and over 18′0″ in three sections. Each plate forms the entire circumference of the boiler, with only one horizontal seam which is placed in the upper quarter of the shell above the fire line.

Our standard 30″ and 36″ diameter boilers are made with handholes only, for cleaning and inspection purposes, but the 36″ diameter boilers can be furnished with a manhole in the shell at an extra charge. Boilers 42″ to 48″ diameter have a manhole in the shell and a handhole in the front head below the tubes. Boilers over 48″ diameter are provided with a manhole in upper part of the shell and one in the front head below the tubes.

Boilers up to and including the 48″x12′0″ are furnished with brackets for resting the boiler on the brickwork. Boilers over this size have hangers for suspending from cross beams and suspension columns. A table on page 14 shows the required size of beams, columns and hangers for carrying the boiler.

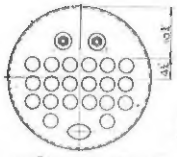
WORKMANSHIP:

All longitudinal seams are either Double Rivetted Butt or Triple Rivetted Butt, depending upon the efficiency of the joint required to obtain the desired working pressure. The rivet holes for the smaller sizes of boilers are punched small before rolling the plate and are reamed to size after rolling. On the larger boilers the holes are drilled from the solid after the plates have been rolled. All seams are carefully caulked and made tight and the boiler is then tested to at least one and one half times the intended working pressure.

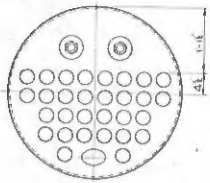
All tube holes are drilled from the solid plate to size. The tubes are expanded and are long enough to make a strong bead at each end.

We are fully prepared to construct boilers of any design, capacity or working pressure, and would be pleased to furnish estimates, designs or other information on request.

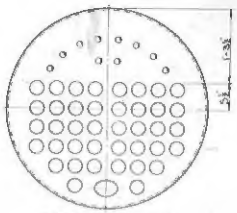
VULCAN STANDARD TUBE ARRANGEMENTS



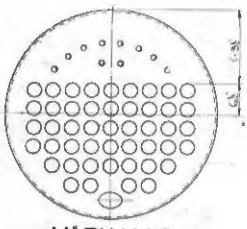
30" DIAM. HEAD
20 - 3" TUBES



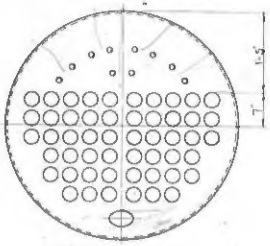
36" DIAM. HEAD
30 - 3" TUBES



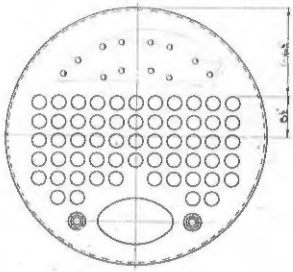
42" DIAM. HEAD
40 - 3" TUBES



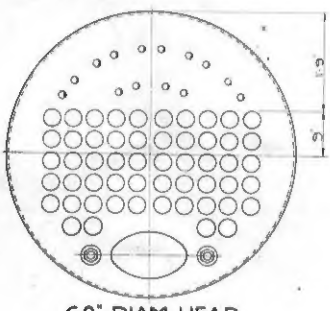
44" DIAM. HEAD
47 - 3" TUBES



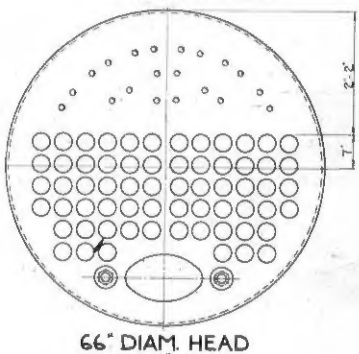
48" DIAM. HEAD
52 - 3" TUBES



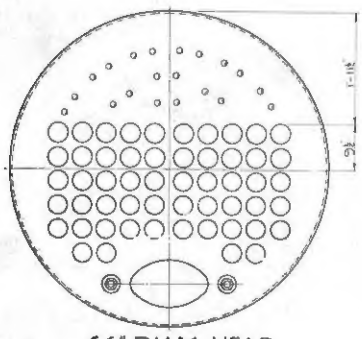
54" DIAM. HEAD
58 - 3" TUBES



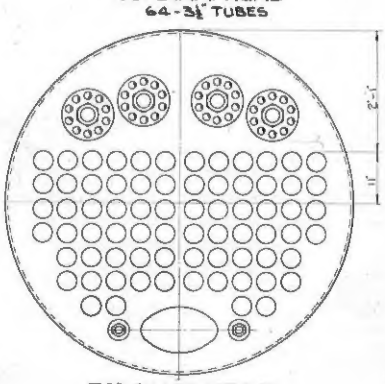
60" DIAM. HEAD
54 - 3½" TUBES



66" DIAM. HEAD
64 - 3½" TUBES



66" DIAM. HEAD
54 - 4" TUBES



72" DIAM. HEAD
72 - 4" TUBES

Fig. No. 318

VULCAN STANDARD HORIZONTAL RETURN TUBULAR BOILERS, 100 lbs. Working Pressure

Horse Power		10	12	15	25	30	32	37	35	40	50	55	55	60	65	60	70	80	90	100	110	100	125	150	175
Diameter of Boiler, inches		30	30	30	36	36	42	42	44	44	48	48	54	54	54	60	60	60	66	66	66	72	72	72	72
Length of Boiler, feet		6	8	10	10	12	10	12	10	12	12	14	12	14	16	12	14	16	14	16	18	14	16	18	20
Maximum working pressure allowed pounds per sq. in.		106	106	106	102	102	108	108	103	103	115	115	102	102	102	112	112	112	102	102	102	101	101	101	101
No. of 3″ Ø tubes		20	20	20	30	30	40	40	47	47	52	52	58	58	58	66	66	66							
No. of 3½″ Ø tubes																54	54	54	64	64	64	86	86	86	86
No. of 4″ Ø tubes																			54	54	54	72	72	72	72
Sectional tube area, sq. ft.	With 3″ Ø tubes	.89	.89	.89	1.33	1.33	1.78	1.78	2.09	2.09	2.31	2.31	2.57	2.57	2.57	2.93	2.93	2.93							
	With 3½″ Ø tubes															3.34	3.34	3.34	3.94	3.94	3.94	5.29	5.29	5.29	5.29
	With 4″ Ø tubes																		4.39	4.39	4.39	5.85	5.85	5.85	5.85
Tube heating surface sq. ft.	With 3″ Ø tubes	90	122	153	233	280	312	374	368	442	490	572	546	638	729	622	726	830							
	With 3½″ Ø tubes															594	693	790	822	940	1056	1100	1260	1420	1580
	With 4″ Ø tubes																		790	902	1014	1058	1210	1361	1512
Total heating surface sq. ft.	With 3″ Ø tubes	120	160	200	290	348	382	455	442	527	585	682	654	761	867	755	866	987							
	With 3½″ Ø tubes															717	833	947	976	1113	1248	1268	1447	1618	1805
	With 4″ Ø tubes																		944	1075	1206	1226	1397	1567	1737
Thickness of shell, inches		¼	¼	¼	9/32	9/32	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	5/16	3/8	3/8	3/8	3/8	3/8	3/8	11/32	11/32	11/32	11/32
Thickness of heads, inches		3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	½	½	½	½	½	½	½	½	½	½
Width of grates		2′6″	2′6″	2′6″	3′0″	3′0″	3′6″	3′6″	3′6″	3′6″	4′0″	4′0″	4′6″	4′6″	4′6″	5′0″	5′0″	5′0″	5′6″	5′6″	5′6″	6′0″	6′0″	6′0″	6′0″
Length of grates		3′0″	3′6″	3′6″	3′6″	4′0″	3′6″	4′0″	4′0″	4′6″	4′0″	4′6″	4′6″	5′0″	5′0″	4′6″	5′0″	5′6″	5′6″	6′0″	6′6″	5′6″	6′0″	6′6″	7′0″
Area of grates, sq. ft.		7.5	8.7	8.7	10.5	12.0	12.2	14.0	14.0	15.7	16.0	18.0	20.2	22.5	22.5	22.5	25.0	27.5	30.2	33.0	35.7	33.0	36.0	39.0	42.0
Size of steam outlet, ins.		2	2	2½	3	3	3	3	3	3	4	4	4	4	4	4	4	4	6	6	6	6	6	6	6
Size of safety valve, ins.		2	2	2	2½	2½	2½	2½	2½	3	3	3	3	3½	3½	3½	3½	3½	2–2½	2–2½	2–2½	2–2½	2–2½	2–3	2–3
Size of feed connection, ins.		1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	2	2	2	2	2	2	2
Size of blow-off connection, ins.		1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2	2	2	2	2	2	2	2	2	2	2	2	2
Size of water column connection, ins.		1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
Shipping weight of bare boiler, lbs.		1350	1650	2100	3000	3400	4100	4800	4500	5200	5900	6700	6800	7700	8600	8600	9650	10900	12200	13650	15100	15000	16800	18600	20400
*Shipping weight with fittings, lbs.		2850	3150	3700	5500	6000	7000	7600	7400	8100	8900	10500	11400	12300	13200	13900	14950	16100	19000	20450	21900	22800	24600	26400	28200

*This weight includes suspension material as listed on page 14.

VULCAN IRON WORKS LIMITED WINNIPEG, CANADA

VULCAN STANDARD HORIZONTAL RETURN TUBULAR BOILERS, 125 lbs. Working Pressure

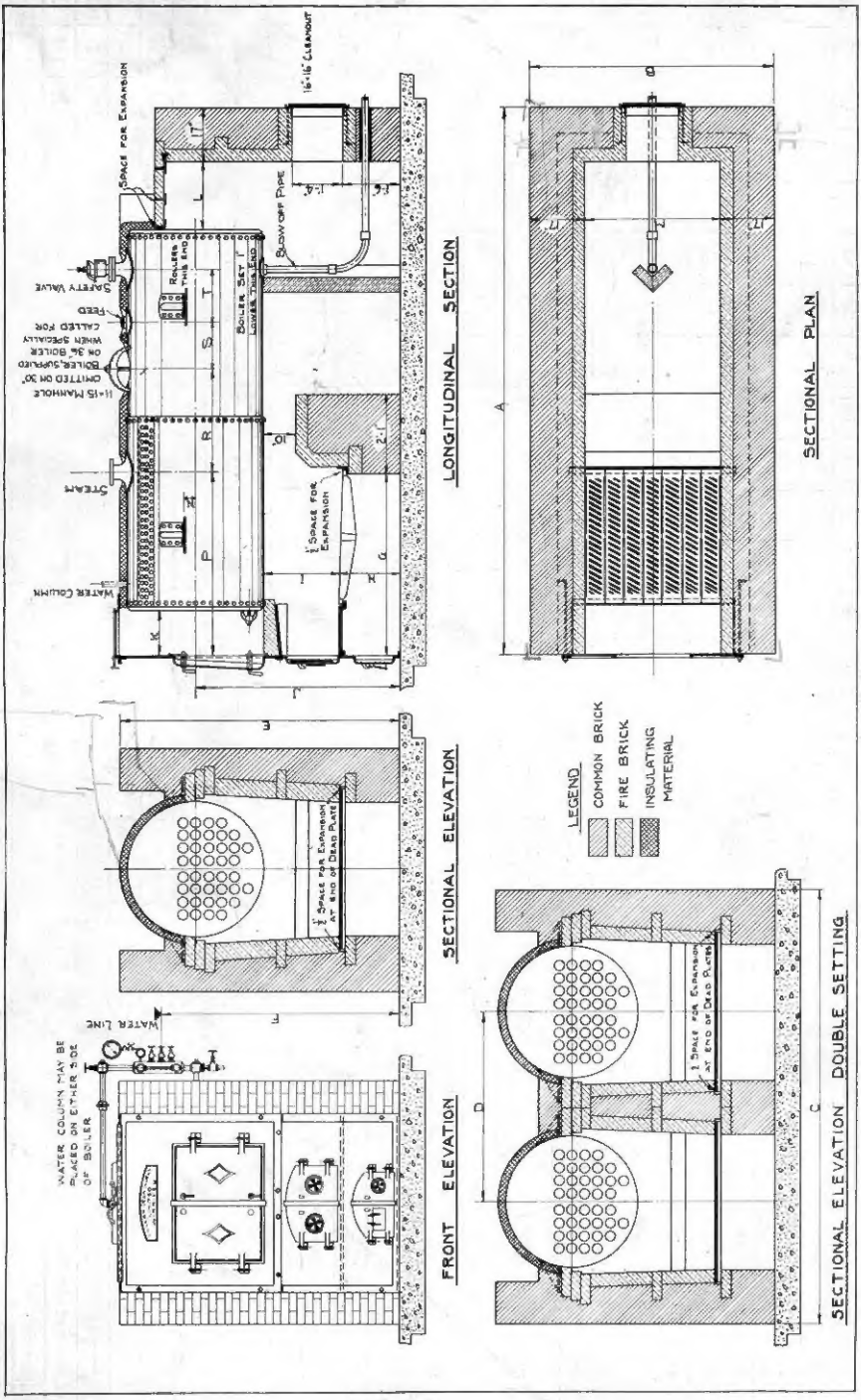
Horse Power		10	12	15	25	30	32	37	35	40	50	55	55	60	65	60	70	80	90	100	110	100	125	150	175
Diameter of Boiler, inches		30	30	30	36	36	42	42	44	44	48	48	54	54	54	60	60	60	66	66	66	72	72	72	72
Length of Boiler, feet		6	8	10	10	12	10	12	10	12	12	14	12	14	16	12	14	16	14	16	18	14	16	18	20
Maximum working pressure allowed pounds per sq. in.		125	125	125	125	125	125	125	125	125	127	127	125	125	125	128	128	128	126	126	126	125	125	125	125
No. of 3′ Ø′ tubes		20	20	20	30	30	40	40	47	47	52	52	58	58	58	66	66	66							
No. of 3½″ Ø tubes																54	54	54	64	64	64	86	86	86	86
No. of 4″ Ø tubes																			54	54	54	72	72	72	72
Sectional tube area, sq. ft.	With 3″ Ø tubes	.89	.89	.89	1.33	1.33	1.78	1.78	2.09	2.09	2.31	2.31	2.57	2.57	2.57	2.93	2.93	2.93							
	With 3½″ Ø tubes															3.34	3.34	3.34	3.94	3.94	3.94	5.29	5.29	5.29	5.29
	With 4″ Ø tubes																		4.39	4.39	4.39	5.85	5.85	5.85	5.85
Tube heating surface sq. ft.	With 3″ Ø tubes	90	122	153	233	280	312	374	368	442	490	572	546	638	729	622	726	830							
	With 3½″ Ø tubes															594	693	790	822	940	1056	1100	1260	1420	1580
	With 4″ Ø tubes																		790	902	1014	1058	1210	1361	1512
Total heating surface sq. ft.	With 3″ Ø tubes	120	160	200	290	348	382	455	442	527	585	682	654	761	867	755	866	987							
	With 3½″ Ø tubes															717	833	947	976	1113	1248	1268	1447	1618	1805
	With 4″ Ø tubes																		944	1075	1206	1226	1397	1567	1737
Thickness of shell, inches		9/32	9/32	9/32	11/32	11/32	11/32	11/32	11/32	11/32	11/32	11/32	8/8	3/8	3/8	7/16	7/16	7/16	15/32	15/32	15/32	½	½	½	½
Thickness of heads, inches		3/8	3/8	3/8	3/8	3/8	3/8	3/8	7/16	7/16	7/16	7/16	7/16	7/16	7/16	½	½	½	½	½	½	½	½	½	½
Width of grates		2′6″	2′6″	2′6″	3′0″	3′0″	3′6″	3′6″	3′6″	3′6″	4′0″	4′0″	4′6″	4′6″	4′6″	5′0″	5′0″	5′0″	5′6″	5′6″	5′6″	6′0″	6′0″	6′0″	6′0″
Length of grates		3′0″	3′6″	3′6″	3′6″	4′0″	3′6″	4′0″	4′0″	4′6″	4′0″	4′6″	4′6″	5′0″	5′0″	4′6″	5′0″	5′6″	5′6″	6′0″	6′6″	5′6″	6′0″	6′6″	7′0″
Area of grates, sq. ft.		7.5	8.7	8.7	10.5	12.0	12.2	14.0	14.0	15.7	16.0	18.0	20.2	22.5	22.5	22.5	25.0	27.5	30.2	33.0	35.7	33.0	36.0	39.0	42.0
Size of steam outlet, ins.		2	2	2½	3	3	3	3	3	3	4	4	4	4	4	4	4	4	6	6	6	6	6	6	6
Size of safety valve, ins.		2	2	2	2	2	2½	2½	2½	2½	2½	2½	3	3	3	3	3	3½	3½	3½	3½	3½	3½	3½	2–2½	2–2½
Size of feed connection, ins.		1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	1½	2	2	2	2	2	2
Size of blow-off connection, ins.		1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2	2	2	2	2	2	2	2	2	2	2	2	2
Size of water column connection, ins.		1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
Shipping weight of bare boiler, lbs.		1400	1750	2200	3250	3750	4300	5000	4800	5500	6150	6950	7300	8300	9200	9400	10700	12000	13300	14900	16400	16100	18000	19950	21900
*Shipping weight with fittings, lbs.		1900	3250	3700	5750	6350	7200	7900	7700	8400	9150	10750	11900	12900	13800	14700	16000	17300	20100	21700	23200	23900	25800	27750	29700

*This weight includes suspension material as listed on page 14.

VULCAN STANDARD HORIZONTAL RETURN TUBULAR BOILERS, 150 lbs. Working Pressure

Horse Power		10	12	15	25	30	32	37	35	40	50	55	55	60	65	60	70	80	90	100	110	100	125	150	175
Diameter of Boiler, inches		30	30	30	36	36	42	42	44	44	48	48	54	54	54	60	60	60	66	66	66	72	72	72	72
Length of Boiler, feet		6	8	10	10	12	10	12	10	12	12	14	12	14	16	12	14	16	14	16	18	14	16	18	20
Maximum working pressure allowed pounds per sq. in.		151	151	151	152	152	150	150	152	152	153	153	150	150	150	150	150	150	150	150	150	150	150	150	150
No. of 3″ Ø tubes		20	20	20	30	30	40	40	47	47	52	52	58	58	58	66	66	66							
No. of 3½″ Ø tubes																54	54	54	64	64	64	86	86	86	86
No. of 4″ Ø tubes																			54	54	54	72	72	72	72
Sectional tube area, sq. ft.	With 3″ Ø tubes	.89	.89	.89	1.33	1.33	1.78	1.78	2.09	2.09	2.31	2.31	2.57	2.57	2.57	2.93	2.93	2.93							
	With 3½″ Ø tubes															3.34	3.34	3.34	3.94	3.94	3.94	5.29	5.29	5.29	5.29
	With 4″ Ø tubes																		4.39	4.39	4.39	5.85	5.85	5.85	5.85
Tube heating surface sq. ft.	With 3″ Ø tubes	90	122	153	233	280	312	374	368	442	490	572	546	638	729	622	726	830							
	With 3½″ Ø tubes															594	693	790	822	940	1056	1100	1260	1420	1580
	With 4″ Ø tubes																		790	902	1014	1058	1210	1361	1512
Total heating surface sq. ft.	With 3″ Ø tubes	120	160	200	290	348	382	455	442	527	585	682	654	761	867	755	866	987							
	With 3½″ Ø tubes															717	833	947	976	1113	1248	1268	1447	1618	1805
	With 4″ Ø tubes																		944	1075	1206	1226	1397	1567	1737
Thickness of shell, inches		5/16	5/16	5/16	5/16	5/16	11/32	11/32	3/8	3/8	13/32	13/32	7/16	7/16	7/16	½	½	½	17/32	17/32	17/32	9/16	9/16	9/16	9/16
Thickness of heads, inches		7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	7/16	½	½	½	½	½	½	½	½	½	9/16	9/16	9/16	9/16
Width of grates		2′6″	2′6″	2′6″	3′0″	3′0″	3′6″	3′6″	3′6″	3′6″	4′0″	4′0″	4′6″	4′6″	4′6″	5′0″	5′0″	5′0″	5′6″	5′6″	5′6″	6′0″	6′0″	6′0″	6′0″
Length of grates		3′0″	3′6″	3′6″	3′6″	4′0″	3′6″	4′0″	4′0″	4′6″	4′0″	4′6″	4′6″	5′0″	5′0″	4′6″	5′0″	5′6″	5′6″	6′0″	6′6″	5′6″	6′0″	6′6″	7′0″
Area of grates, sq. ft.		7.5	8.7	8.7	10.5	12.0	12.2	14.0	14.0	15.7	16.0	18.0	20.2	22.5	22.5	22.5	25.0	27.5	30.2	33.0	35.7	33.0	36.0	39.0	42.0
Size of steam outlet, ins.		2	2	2½	3	3	3	3	3	3	4	4	4	4	4	4	4	4	6	6	6	6	6	6	6
Size of safety valve, ins.		1½	2	2	2	2	2	2	2	2½	2½	2½	2½	3	3	3	3	3	3	3½	3½	3½	3½	3½	2–2½
Size of feed connection, ins.		1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1½	1½	1½	2	2	2	2	2	2	2
Size of blow-off connection, ins.		1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	1½	2	2	2	2	2	2	2	2	2	2	2	2	2
Size of water column connection, ins.		1	1	1	1	1	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼	1¼
Shipping weight of bare boiler, lbs.		1475	1850	2325	3250	3750	4450	5300	4950	5700	6600	7500	7700	8550	9600	9700	11100	12500	14000	15700	17400	17000	19100	21150	23200
*Shipping weight with fittings, lbs.		2975	3350	3825	5750	6350	7350	8200	7850	8600	9600	11300	12300	13150	14200	15000	16400	17800	20800	22500	24200	24800	26900	28950	31000

*This weight includes suspension material as listed on page 14.



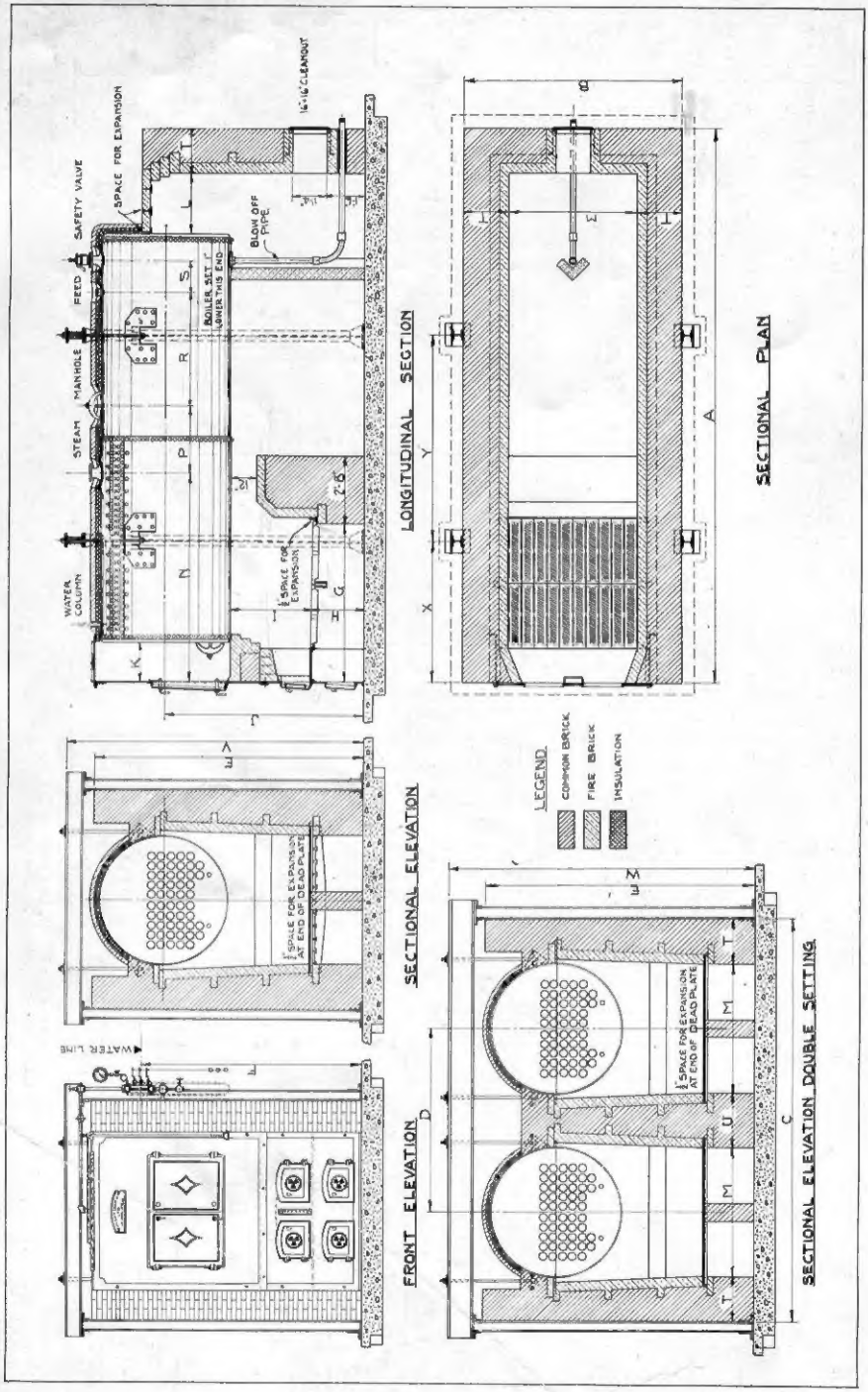
Setting Plan for VULCAN Power Boilers up to 48″ x 12′0″.—Fig. No. 319

VULCAN H.R.T. POWER BOILERS—Dimensions and Data for Settings

Diameter		30″			36″		42″		44″		48″
Length		6′ 0″	8′ 0″	10′ 0″	10′ 0″	12′ 0″	10′ 0″	12′ 0″	10′ 0″	12′ 0″	12′ 0″
Length of Setting	A	10′ 0″	12′ 0″	14′ 0″	14′ 3″	16′ 3″	14′ 7″	16′ 7″	14′ 7″	16′ 7″	16′ 7″
Width of Single Setting	B	5′ 4″	5′ 4″	5′ 4″	5′10″	5′10″	6′ 4″	6′ 4″	6′ 4″	6′ 4″	6′10″
Width of Double Setting	C						11′ 3″	11′ 3″	11′ 3″	11′ 3″	12′ 3″
Centre to Centre of Boilers, Double Setting	D						4′11″	4′11″	4′11″	4′11″	5′ 5″
Height of Setting	E	5′ 6″	5′ 6″	5′ 6″	6′ 4″	6′ 4″	7′ 3¼″	7′ 3¼″	7′ 3¼″	7′ 3¼″	7′ 8½″
Floor to Waterline	F	4′11½″	4′11½″	4′11½″	5′ 5½″	5′ 5½″	6′ 2¼″	6′ 2¼″	6′ 2″	6′ 2″	6′ 7¾″
Front to Bridgewall	G	3′11″	4′ 5″	4′ 5″	4′ 8½″	5′ 2½″	4′ 8½″	5′ 2½″	5′ 2½″	5′ 8½″	5′ 2½″
Floor to Grates	H	1′ 3″	1′ 3″	1′ 3″	1′ 4¼″	1′ 4¼″	1′ 7″	1′ 7″	1′ 7″	1′ 7″	1′ 7½″
*Grates to Shell, Minimum	I	1′ 8″	1′ 8″	1′ 8″	1′ 9½″	1′ 9½″	1′11½″	1′11½″	1′ 9″	1′ 9″	2′ 0″
Floor to Centre Line of Boiler	J	4′ 2¼″	4′ 2¼″	4′ 2¼″	4′ 8″	4′ 8″	5′ 3¾″	5′ 3¾″	5′ 2¼″	5′ 2¼″	5′ 7¾″
Front to Boiler	K	10″	10″	1′ 1″	1′ 2″	1′ 2″	1′ 2″	1′ 2″	1′ 2″	1′ 2″	1′ 2″
Boiler to Back Wall	L	1′ 8″	1′ 8″	1′ 8″	1′ 8″	1′ 8″	2′ 0″	2′ 0″	2′ 0″	2′ 0″	2′ 0″
Side Wall to Side Wall	M	2′ 6″	2′ 6″	2′ 6″	3′ 0″	3′ 0″	3′ 6″	3′ 6″	3′ 6″	3′ 6″	4′ 0″
Centre Line of Boiler to Bracket	N	1″	1″	1″	2″	2″	3⅜″	3⅜″	2⅞″	2⅞″	3⅞″
Front to Steam Outlet	P	2′ 9″	2′ 9″	5′ 1″	5′ 1″	7′ 1″	5′ 1″	7′ 1″	5′ 1″	7′ 1″	6′11″
Steam Outlet to Manhole	R	1′ 3″	1′ 3″	2′ 7½″	2′ 7½″	2′ 7½″	2′ 2″	2′ 2″	2′ 2″	2′ 2″	2′ 3¼″
Manhole to Feed	S						1′ 2½″	1′ 2½″	1′ 2½″	1′ 2½″	1′ 3″
Feed to Safety Valve	T	1′11½″	3′11½″	2′ 2¼″	2′ 2¼″	2′ 2¼″	1′ 8″	1′ 8″	1′ 8″	1′ 8″	1′ 5½″
**Thickness of Reinforced Concrete		6″	6″	6″	6″	6″	8″	8″	8″	8″	8″

*This height is determined by size of pattern for Front, but may be increased to any desired height by inserting a filler piece between upper and lower halves of front, in which case dimensions E, F, J are increased correspondingly. For burning lignite or bituminous coal we recommend that the distance from grates to shell be as given on page 16.

**This thickness is based on average soil conditions.



Setting Plan for VULCAN Power Boilers over 48″ x 12′0″.—Fig. No. 320

VULCAN H.R.T. POWER BOILERS—Dimensions and Data for Settings

Diameter		48"	54"			60"			66"			72"			
Length		14'0"	12'0"	14'0"	16'0"	12'0"	14'0"	16'0"	14'0"	16'0"	18'0"	14'0"	16'0"	18'0"	20'0"
Length of Setting	A	18'7"	17'1"	19'1"	21'1"	17'7"	19'7"	21'7"	19'7"	21'7"	23'7"	19'7"	21'7"	23'7"	25'7"
Width of Single Setting	B	6'10"	8'0"	8'0"	8'0"	8'6"	8'6"	8'6"	9'0"	9'0"	9'0"	9'6"	9'6"	9'6"	9'6"
Width of Double Setting	C	12'3"	14'3"	14'3"	14'3"	15'7"	15'7"	15'7"	16'7"	16'7"	16'7"	17'7"	17'7"	17'7"	17'7"
Centre to Centre of Boilers, Double Setting	D	5'5"	6'3"	6'3"	6'3"	7'1"	7'1"	7'1"	7'7"	7'7"	7'7"	8'1"	8'1"	8'1"	8'1"
Height of Setting	E	7'8½"	9'2"	9'2"	9'2"	9'4½"	9'4½"	9'4½"	10'2¼"	10'2¼"	10'2¼"	10'7"	10'7"	10'7"	10'7"
Floor to Waterline	F	6'7¾"	7'10¼"	7'10¼"	7'10¼"	7'9½"	7'9½"	7'9½"	8'5¼"	8'5¼"	8'5¼"	8'9"	8'9"	8'9"	8'9"
Front to Bridgewall	G	5'8½"	5'8½"	6'2½"	6'2½"	5'8½"	6'2½"	6'8½"	6'8½"	7'2½"	7'2½"	6'8½"	7'2½"	7'8½"	8'2½"
Floor to Grates	H	1'7½"	1'11½"	1'11½"	1'11½"	1'11½"	1'11½"	1'11½"	2'1½"	2'1½"	2'1½"	2'1½"	2'1½"	2'1½"	2'1½"
*Grates to Shell, Minimum	I	2'0"	2'6"	2'6"	2'6"	2'1½"	2'1½"	2'1½"	2'4"	2'4"	2'4"	2'3"	2'3"	2'3"	2'3"
Floor to Centre Line of Boiler	J	5'7¾"	6'8¾"	6'8¾"	6'8¾"	6'7¼"	6'7¼"	6'7¼"	7'2¾"	7'2¾"	7'2¾"	7'5"	7'5"	7'5"	7'5"
Front to Boiler	K	1'2"	1'4"	1'4"	1'4"	1'6"	1'6"	1'6"	1'6"	1'6"	1'6"	1'6"	1'6"	1'6"	1'6"
Boiler to Backwall	L	2'0"	2'0"	2'0"	2'0"	2'4"	2'4"	2'4"	2'4"	2'4"	2'4"	2'4"	2'4"	2'4"	2'4"
Sidewall to Sidewall	M	4'0"	4'6"	4'6"	4'6"	5'0"	5'0"	5'0"	5'6"	5'6"	5'6"	6'0"	6'0"	6'0"	6'0"
Front to Steam Outlet	N	7'11½"	6'0"	7'0"	8'0"	6'0"	7'0"	8'0"	7'0"	8'0"	9'0"	7'0"	8'0"	9'0"	10'0"
Steam Outlet to Manhole	P	2'3¼"	2'9"	2'9"	2'9"	2'9"	2'9"	2'9"	2'9"	2'9"	2'9"	3'0"	3'0"	3'0"	3'0"
Manhole to Feed	R	2'7½"	2'3"	3'3"	4'3"	2'3"	3'3"	4'3"	3'3"	4'3"	5'3"	2'10½"	3'10½"	4'10½"	5'10½"
Feed to Safety Valve	S	1'0½"	1'3"	1'3"	1'3"	1'3"	1'3"	1'3"	1'3"	1'3"	1'3"	1'4"	1'4"	1'4"	1'4"
Thickness of Walls	T	17"	21"	21"	21"	21"	21"	21"	21"	21"	21"	21"	21"	21"	21"
Thickness of Centre Wall	U	17"	21"	21"	21"	25"	25"	25"	25"	25"	25"	25"	25"	25"	25"
Height of Suspension Beam, Single Setting	V	8'9½"	10'5"	10'5"	10'5"	10'9"	10'9"	10'9"	11'7"	11'7"	11'7"	12'0"	12'2"	12'2"	12'2"
Height of Suspension Beam, Double Setting	W	8'11½"	10'7"	10'9"	10'9"	11'0"	11'0"	11'0"	11'9"	12'0"	12'0"	12'5"	12'8"	12'8"	12'8"
Front to Column	X	4'8"	4'4"	4'10"	5'4"	4'6"	5'0"	5'6"	5'0"	5'6"	6'0"	5'0"	5'6"	6'0"	6'6"
Centre to Centre of Columns	Y	7'0"	6'0"	7'0"	8'0"	6'0"	7'0"	8'0"	7'0"	8'0"	9'0"	7'0"	8'0"	9'0"	10'0"
**Thickness of Reinforced Concrete Slab		8"	8"	8"	8"	10"	10"	10"	10"	10"	10"	10"	10"	10"	10"

*This height is determined by size of pattern for Front, but may be increased to any desired height by inserting a filler piece between upper and lower halves of front, in which case dimensions E, F, J are increased correspondingly.

For burning lignite or bituminous coal, we recommend that the distance from grates to shell be as given on page 16.

**Thickness of reinforced concrete slab is based on average soil conditions.

VULCAN H.R.T. POWER BOILERS

Additional Table of Data for Settings

Diameter			30″			36″		42″		44″		48″	
Length			6′0″	8′0″	10′0″	10′0″	12′0″	10′0″	12′0″	10′0″	12′0″	12′0″	14′0″
Number of Firebricks		One Boiler	610	695	780	890	1000	1110	1210	1110	1210	1350	1450
		Two Boilers						2220	2420	2220	2420	2700	2900
Number of Fire Bricks for each additional Foot in Height		One Boiler	130	150	170	185	210	195	220	195	220	225	250
		Two Boilers						390	440	390	440	450	500
Number of Common Bricks		One Boiler	3750	4330	4910	5900	6600	6800	7700	6800	7700	8500	9800
		Two Boilers						10300	11900	10300	11900	13200	15000
Number Common Bricks for each additional Foot in Height		One Boiler	600	700	800	860	970	890	1000	890	1000	1020	1380
		Two Boilers						1260	1410	1260	1410	1450	2100
Height x Width of Breeching, inches		One Boiler	12x15	12x15	12x15	15x17½	15x17½	15x24	15x24	17½x24	17½x24	17½x26	17½x26
		Two Boilers						24x30	24x30	24x35	24x35	24x38	24x38
*Floor to Top of Breeching		One Boiler	6′9½″	6′9½″	6′9½″	7′10½″	7′10½″	8′10″	8′10″	9′0½″	9′0½″	9′5½″	9′5½″
		Two Boilers						8′10″	8′10″	9′0½″	9′0½″	9′5½″	10′0″
Dimensions of Stacks for Natural Draft	Diameter in Inches	One Boiler	15	15	15	18	18	20	20	22	22	24	24
		Two Boilers						26	26	26	26	30	30
	Height in Feet**	One Boiler	25	25	25	30	35	35	40	40	45	50	50
		Two Boilers						45	50	50	55	60	60
Clear Space required in Front of Boiler			5′8″	7′8″	9′8″	9′6″	11′6″	9′6″	11′6″	9′6″	11′6″	11′6″	13′6″

*Minimum distance from top of Breeching to Ceiling for Fireproof Ceilings is 6″, and for Ceilings of Wood Construction 12″.

**Where unfavorable conditions occur for draft, stacks should be not less than 35 feet high. For Special Installations consult our Engineering Department.

VULCAN IRON WORKS LIMITED WINNIPEG, CANADA

VULCAN H.R.T. POWER BOILERS

Additional Table of Data for Settings

Diameter			54″			60″			66″			72″			
Length			12′0″	14′0″	16′0″	12′0″	14′0″	16′0″	14′0″	16′0″	18′0″	14′0″	16′0″	18′0″	20′0″
Number of Firebricks		One Boiler	1820	2000	2180	1900	2080	2260	2160	2330	2500	2310	2500	2690	2880
		Two Boilers	3640	4000	4360	3800	4160	4520	4320	4660	5000	4620	5000	5380	5760
Number of Fire Bricks for each additional Foot in Height		One Boiler	255	280	305	270	295	330	300	330	360	310	340	370	400
		Two Boilers	510	560	610	540	590	660	600	660	720	620	680	740	800
Number of Common Bricks		One Boiler	14300	15800	17300	15400	16900	18400	18000	19700	21400	19100	20800	22500	24200
		Two Boilers	21800	22900	24600	23400	25400	27400	26900	29200	31500	28700	31000	33300	35600
Number Common Bricks for each additional Foot in Height		One Boiler	1790	1910	2030	1850	2000	2150	2050	2200	2350	2100	2250	2400	2550
		Two Boilers	2660	2870	3080	2940	3160	3380	3270	3480	3690	3360	3580	3800	4020
Height x Width of Breeching, inches		One Boiler	20x27	20x27	20x27	24x30	24x30	24x30	24x36	24x36	24x36	33x35	33x35	33x35	33x35
		Two Boilers	27x35½	27x35½	27x35½	36x38	36x38	36x38	36x46	36x46	36x46	42x54	42x54	42x54	42x54
*Floor to Top of Breeching		One Boiler	11′1½″	11′1½″	11′1½″	11′8″	11′8″	11′8″	12′5¾″	12′5¾″	12′5¾″	13′7½″	13′7½″	13′7½″	13′7½″
		Two Boilers	11′8½″	11′8½″	11′8½″	12′8″	12′8″	12′8″	13′6″	13′6″	13′6″	14′4½″	14′4½″	14′4½″	14′4½″
Dimensions of Stacks for Natural Draft	Diameter in Inches	One Boiler	26	26	26	26	28	28	30	30	33	33	36	36	36
		Two Boilers	30	33	33	33	33	36	36	41	41	48	48	48	48
	Height in Feet**	One Boiler	50	55	60	55	60	60	60	65	70	70	75	80	90
		Two Boilers	60	65	70	65	70	70	75	80	85	85	90	95	105
Clear Space required in Front of Boiler			11′4″	13′4″	15′4″	11′4″	13′4″	15′4″	13′4″	15′4″	17′4″	13′2″	15′2″	17′2″	19′2″

*Minimum distance from top of Breeching to Ceiling for fireproof Ceilings is 6″, and for Ceilings of wood construction 12″.

**Where unfavorable conditions occur for draft, stacks should be not less than 35 feet high. For special installations consult our Engineering Department.

VULCAN H.R.T. POWER BOILERS—Table of Suspension Material

Diameter			48"	54"		60"			66"			72"			
Length			14'0"	12'0"	14'0"	16'0"	12'0"	14'0"	16'0"	14'0"	16'0"	18'0"	14'0"	16'0"	18'0"	20'0"
SUSPENSION BEAMS	Single Setting	Size	2-7" Cs @ 9.8#	2-8" Cs @ 11.5#	2-8" Cs @ 11.5#	2-8" Cs @ 11.5#	2-9" Cs @ 13.4#	2-9" Cs @ 13.4#	2-9" Cs @ 13.4#	2-10" Cs @ 15.3#	2-10" Cs @ 15.3#	2-10" Cs @ 15.3#	2-10" Cs @ 15.3#	2-12" Cs @ 20.7#	2-12" Cs @ 20.7#	2-12" Cs @ 20.7#
		Overall Length	8'0"	9'4"	9'4"	9'4"	9'10"	9'10"	9'10"	10'6"	10'6"	10'6"	11'0"	11'0"	11'0"	11'0"
	Double Setting	Size	2-9" I's @ 21.8#	2-10" I's @ 25.4#	2-12" I's @ 31.8#	2-12" I's @ 31.8#	2-12" I's @ 31.8#	2-12" I's @ 31.8#	2-12" I's @ 40.8#	2-12" I's @ 40.8#	2-15" I's @ 42.9#	2-15" I's @ 42.9#	2-15" I's @ 42.9#	2-18" I's @ 54.7#	2-18" I's @ 54.7#	2-18" I's @ 54.7#
		Overall Length	13'5"	15'7"	15'7"	15'7"	16'11"	16'11"	16'11"	18'1"	18'1"	18'1"	19'1"	19'1"	19'1"	19'1"
COLUMNS	Single Setting	Size	4" H @ 13.8#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	6" H @ 20#	6" H @ 20#	6" H @ 20#	6" H @ 20#
		*Overall Height	8'2½"	9'9"	9'9"	9'9"	10'0"	10'0"	10'0"	10'9"	10'9"	10'9"	11'2"	11'2"	11'2"	11'2"
		Max. Height for this Size Column	10'4"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	15'0"	15'0"	15'0"	15'0"
		Max. Height Grates to Shell for this Size Col.	4'1½"	5'9"	5'9"	5'9"	5'1½"	5'1½"	5'1½"	4'7"	4'7"	4'7"	6'1"	6'1"	6'1"	6'1"
	Double Setting	Size	4" H @ 13.8#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	5" H @ 18.9#	6" H @ 20#	6" H @ 20#	6" H @ 20#	6" H @ 20#
		*Overall Height	8'2½"	9'9"	9'9"	9'9"	10'0"	10'0"	10'0"	10'9"	10'9"	10'9"	11'2"	11'2"	11'2"	11'2"
		Max. Height for this Size Column	10'4"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	13'0"	15'0"	15'0"	15'0"	15'0"
		Max. Height Grates to Shell for this Size Col.	4'1½"	5'9"	5'9"	5'9"	5'1½"	5'1½"	5'1½"	4'7"	4'7"	4'7"	6'1"	6'1"	6'1"	6'1"
Suspension Rods		Diameter	1¼"	1¼"	1¼"	1¼"	1½"	1½"	1½"	1½"	1½"	1¾"	1¾"	1¾"	2"	2"
		Length, Single Setting	3'3"	3'8½"	3'8½"	3'8½"	3'10½"	3'10½"	3'10½"	4'0½"	4'0½"	4'0½"	4'2½"	4'4½"	4'4½"	4'4½"
		Length, Double Setting	3'5"	3'10½"	4'0½"	4'0½"	4'1½"	4'1½"	4'1½"	4'2½"	4'5½"	4'5½"	4'7½"	4'10½"	4'10½"	4'10½"
Approx. Shipping Weight, lbs.		Single Setting	1010	1430	1430	1430	1550	1550	1550	1870	1870	1870	1940	2230	2230	2230
		Double Setting	1940	2680	3080	3080	3300	3300	3900	4300	4450	4450	4700	5700	5700	5700

*This height is for the minimum distance from grates to shell shown in table on page 11 as dimension "I." When the height from grates to shell is increased, this overall height is increased correspondingly.

It is recommended, especially for the larger and higher settings, that the columns be braced and that the settings be strengthened with buckstays as illustrated by figure No. 321, page 16.

Where space is available, boilers 66" diam. and over should be set singly.

Our Engineering Department is at your service, and would be glad to assist you in working out your boiler installation problems.

VULCAN H.R.T. POWER BOILERS
LIST OF STANDARD FITTINGS

Boilers up to and including 48″ diameter are supplied with the following:

1—C.I. Upper Section of Front with right and left Smokebox Doors.

1—C.I. Lower Section of Front with right and left firedoors having draft discs and baffle plates attached; right and left ashpit doors, one with damper door and one with draft disc.

Sufficient bolts for joining sections of front together, also sufficient anchor bolts for securely anchoring front to brickwork.

1—C.I. Stack Plate.
1—Steel Plate Damper.
1—C.I. Arch Plate.
1—Set of Standard Diagonal Grate Bars.
2—C.I. Angle Bars.
1—C.I. Tee Bar (for boilers up to 42″ dia. inclusive).
2—C.I. Tee Bars (for boilers over 42″dia.)
1—C.I. Cleanout Door.
4—Anchor Rods for Cleanout.
1—C.I. Water Column.
3—Gauge Cocks.
1—Set of Water Gauge Mountings. Piping, valves and fittings, etc., for connecting water column.
1—Steam Gauge with cock and syphon.
1—Safety Valve.
1—Gasket for Safety Valve.
1—Blow-off Valve "Y" type.
Blow-off piping to exterior of boiler.
1—Flue Cleaner with handle 6″ longer than tubes.
1 Poker.
1—Scraper.
4—Steel Bearing Plates } For boilers up to and including 48″⌀x12′0″ long.
4—Steel Rollers }

Suspension Material, including:

4 Columns. } For 48″x14′0″ boiler only.
2—Compound Beams. }
4—Hanger Rods. }
Necessary bolts for erection.

Boilers 54″ diameter and over are supplied with the following:—

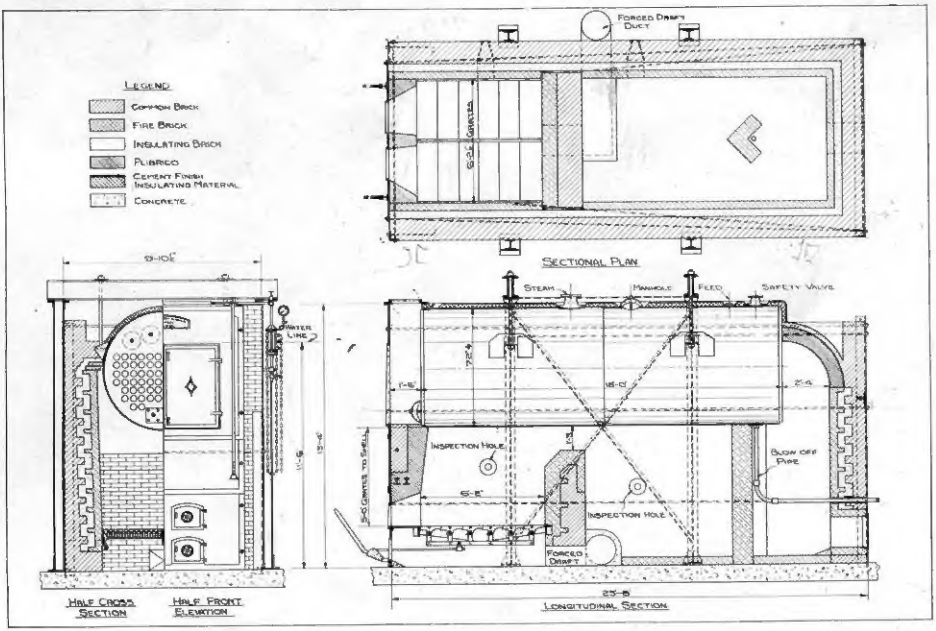
1—C.I. Upper Section of Front with right and left smokebox doors.

1—C.I. Lower Section of Front with right and left firedoors with baffle plates and draft discs; right and left ashpit doors with draft discs; baffle plate between firedoors with sliding damper.
Sufficient bolts for joining sections of front together, also sufficient anchor bolts for securely anchoring front to brickwork.

1—C.I. Stack Plate.
1—Steel Plate Damper with operating mechanism.
1 C.I. Dead Plate.
1—Set of Standard Diagonal Grate Bars.
1—C.I. Centre Bearing Bar for grates (when required).
2—C.I. Angle Bars.
2—C.I. Tee Bars.
1—C.I. Cleanout Door and Frame.
4—Anchors for Cleanout.
1—C.I. Water Column.
3—Gauge Cocks.
1 Set of Water Gauge Mountings.
(Gauge Cocks and Water Gauge Mountings are supplied complete with chains, etc., for operating on high settings.)
Piping, Valves and Fittings, etc., for connecting Water Column.
1 Steam Gauge with cock and syphon.
1 Safety Valve (two supplied for sizes requiring two valves also "Y" base connected to boiler.)
1—Gasket for Safety Valve.
1—Blow-off Valve "Y" Type.
Blow-off Piping to exterior of boiler.
1—Flue Cleaner with handle 6″ longer than tubes.
1—Poker.
1—Scraper.
Suspension Material, including:
4—Columns.
2—Compound Beams.
4—Hanger Rods.
Necessary bolts for erection.

No Arch Plate is supplied with boilers 51″ diameter and over, as it is customary to build the arch of firebrick. However, we carry special C.I. Arches for this purpose, which can be supplied at an extra cost if required.

Buckstays, through buckstay rods, etc., are considered as an extra and are therefore not called for in the list of standard fittings.



150 H.P. VULCAN Power Boiler Setting, with special grates and large combustion chamber for burning lignite coal, fully braced and insulated.

Fig. No. 321

The fuel to be used and the rating expected from a boiler has considerable bearing on the type of brick setting required. The data on brick settings listed on the preceding pages are for average conditions only and we assume no responsibility in connection with their use unless passed upon by our Engineering Department for each particular installation.

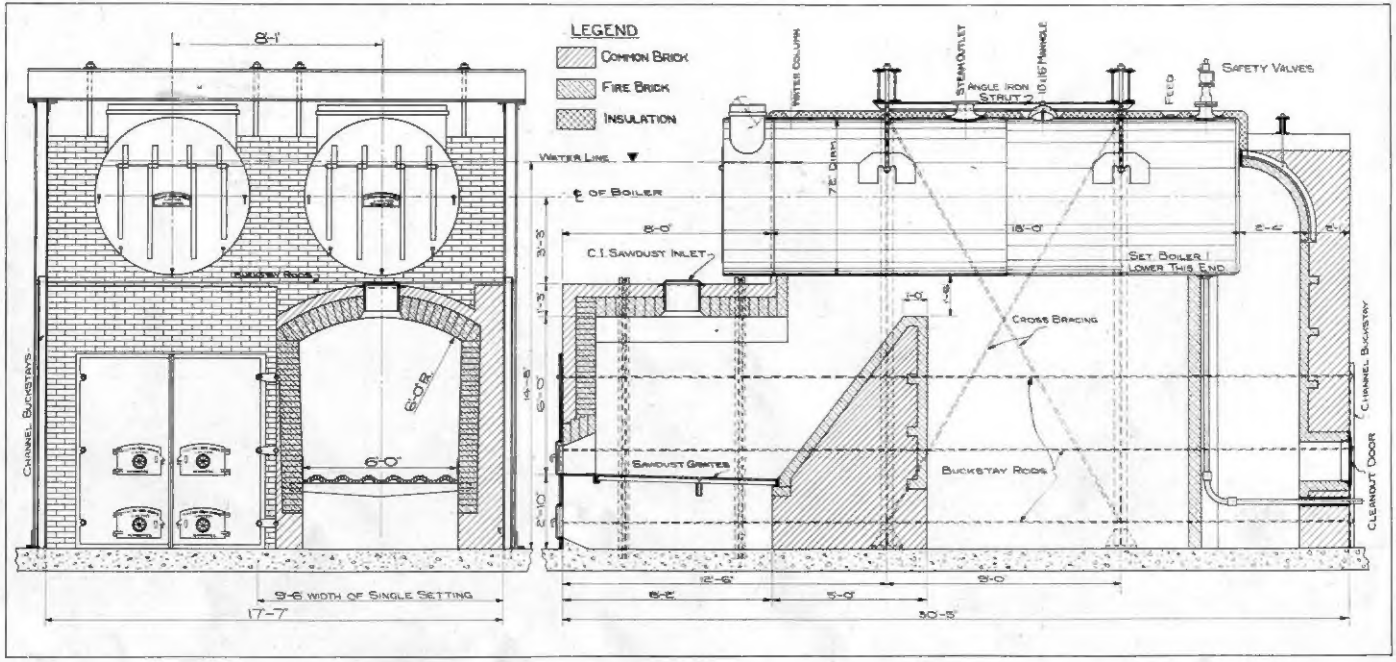
For burning Western Lignite and other low rank coals a large combustion space is essential. We recommend the following heights from grates to shell for burning lignite.

48″ Diam. Boiler	48 inches
54″ " "	48 "
60″ " "	54 "
66″ " "	54 "
72″ " "	60 "

For the efficient combustion of low rank fuels, such as lignite, grates of the proper design must be used. With such grates efficiencies up to 73% have been obtained with this fuel. We manufacture grates designed especially for this purpose and would strongly recommend their installation where lignite coal is to be used.

Forced draft equipment is not essential, but is very desirable on most installations, as a greater efficiency will result due to more complete combustion and lower stack temperatures.

Write to us for advice on your boiler installation and we shall be glad to submit plans and estimates.



150 H.P. VULCAN Power Boiler with Dutch Oven Setting.

Fig. No. 322

In Saw Mills and other industries where there is a continuous supply of combustible refuse, the Dutch Oven Setting offers an economical method of turning this waste into power. Shavings and other refuse may be introduced into the furnace by means of the sawdust inlet shown in the above plan. The oven is built high enough to permit a very thick fuel bed and a large combustion chamber. We are prepared to submit plans for all sizes of installations to suit the conditions of fuels and capacities.

VULCAN GRATES

Diagonal Grate Bar
Fig. No. 323

DIAGONAL GRATE BAR

This type of bar is regularly furnished with VULCAN Power and Heating Boilers.

5⅛″ wide x 24″, 30″, 36″, 42″, 48″, 54″ or 60″ long. To obtain greater lengths use a centre bearing bar.

Single Bar Common Grate (5 Sections)
Fig. No. 324

SINGLE BAR COMMON GRATE

This type of bar is adaptable to any size of furnace as it can be built up to any width..

1¼″ wide x 21″, 24″, 27″, 30″, 36″, 42″, 48″, 54″, 60″ or 66″ long.

Double Bar Common Grate Bar
Fig. No. 325

DOUBLE BAR COMMON GRATE

This type of bar is furnished in the following sizes:

2″ or 2½″ wide x 30″ long.
3″ wide x 36″ or 42″ long.
3½″ wide x 42″, 48″, 54″ or 60″ long.

Herringbone Grate Bar
Fig. No. 326

HERRINGBONE GRATE BAR

This type of bar is furnished in the following sizes:

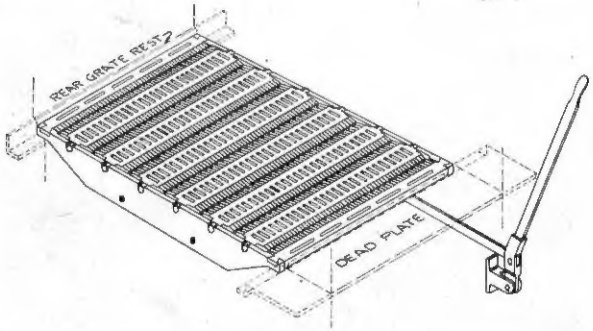
5¼″ wide x 30″, 36″, 42″ or 48″.

Sawdust Grate Bar
Fig. No. 327

SAWDUST GRATE BAR

Sawdust Grates can be furnished in either of two types, namely: Cone type or Stepped type.

Cone type (as illustrated).
10″ or 12″ wide x any length up to 48″.
Stepped type.
10½″ or 12″ wide x any length up to 52″.



VULCAN Standard Rocking Grates
Fig. No. 364

VULCAN STANDARD ROCKING GRATES

VULCAN Rocking Grates can be made up in multiples of 6 inches in width and 6 inches in length.

They can be installed in H.R.T. Boilers as illustrated. $\frac{7}{16}$″ Air Space, ½″ Bridge.

Note: We manufacture many types of grates which have not been illustrated here, such as specially designed rocking and dumping grates for burning lignite coal, etc.

We will be pleased to advise you on your combustion problem and to suggest the proper grate for your condition of firing.

We would be pleased to submit designs and estimates on power plant equipment. The following are some of our specialties:

SMOKE BREECHINGS

"V" Type Breeching

for connecting two boilers to one stack.

Fig. No. 362a

Horizontal Breeching

for connecting two or more boilers to one stack.

Fig. No. 362b

We manufacture breechings of any type or size to suit the conditions of the boiler room and can make them of either welded or rivetted construction.

SMOKE STACKS

Welded or Rivetted.
Self Supporting or Guyed.

DRAFT DUCTS

Welded or Rivetted.

COAL HANDLING EQUIPMENT

Elevators—Conveyors—Pivotted Bucket Carriers.
Hoppers—Feeders.

ASH REMOVING APPARATUS

Hydraulic and Hand Operated Hoists
Ash Cars Ash Drags

BLOW-OFF TANKS

Steel Plate—Cast Iron.
Built to conform with the Canadian Inter-Provincial Regulations.

FEED WATER HEATERS

BOILERS

Heating Horizontal Return Tubular, Firebox, Vulcan Combination and Vulca.

Power Horizontal Return Tubular, Locomotive Type Firebox, Return Tubular Firebox and Vertical.

Write for pamphlets on the above VULCAN products and we shall be pleased to mail them to you.